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THROUGH THE HEART OF ASIA.

Through the Heart of Asia: Over the Pamir to India. By Gabriel Bonvalot. Translated from the French by C. B. Pitman. (London: Chapman and Hall, 1889.)

THIS is a translation of the account of a very remarkable journey taken in the year 1886 by M. Bonvalot through Central Asia. It is not the first time that M. Bonvalot has traversed that region, for in the years 1880–82, accompanied by M. Capus, and starting from Moscow, he entered Turkestan from Siberia, explored part of Bokhara and the mountains of Kohistan and Chitral, and returning home by Samarcand and Bokhara, descended the Amu-daria to Khiva, and finally crossed the desert of Ust-Urt in the depth of winter. That journey, however, only embraced the country north of the Oxus, and the present one was undertaken to complete the exploration of Central Asia. Shortly speaking, the latter journey—that of which this work treats—began at Batum, whither MM. Bonvalot and Capus had gone by ship from Marseilles, and continued through the Caucasus along the south-west shore of the Caspian Sea into Persia, thence into Bokhara. At Chitral, on the borders of Afghanistan, they were detained as prisoners by Ishak Khan, of whom we have heard so much lately. He was then in revolt against Abdurrahman, and his captives were not released till the Indian Government interfered on their behalf.

There is very much to interest us in M. Bonvalot's account of the feelings of the native tribes in that vast region towards England and towards Russia, but that we shall pass over, merely pointing out what is most important from a geographical or ethnological point of view in the work. At Adshi-Cabul, which is on the south-west shore of the Caspian, he says that the population is Turkish, though the country is Tartar. The men are tall, with good features, and are plainly a mixture of Caucasian and Persian. Their dress differs from that of other Mahometans in that the tight-fitting upper garments with long skirts are not frequently seen; they seldom reach below the knee, and are often open at the breast. The head-dress is higher and broader at the top than the usual Mahometan head-dress, and in place of high boots they wear broad slippers or sandals, with very large wooden heels and curled-up toes. The feet are bare, and are covered with woollen socks, which have fantastic coloured figures worked on them. It was the festival of the New Year when the travellers arrived at Adshi-Cabul, and the whole place was *en fête*. The Mahometans of the region on such occasions dye their hands, beard, and hair a bright red, with henna. The Turkish language was the only one spoken there, but a few stages further on it seemed as if a new world was reached, where the Russian tongue, Russian fashions, Russian cattle and horses, were everywhere. This, it appears, was due to the descendants of a body of Russian settlers, called Malakanes, who had left their homes on account of their religion, but it is not quite clear in what respect they differed from the orthodox Russian Church. The country—that is, the region north-west of Resht—is wonderfully fertile, but the inhabitants suffer terribly from fevers. The waters swarm with duck, teal, herons, and cormorants; eagles and foxes abound there.

Further on, still on the shores of the Caspian, may be seen "all the birds of creation." Generally speaking, the ground held by the Tartars is badly cultivated: the men are incorrigible idlers, lying in the fields while the women sow the seed; and in harvest-time, instead of gathering in the crops themselves, they sell them as they stand in the fields to the mountaineers for about a third of their value. Though there is an abundance of good timber at hand, they live in wretched hovels with thatched roofs, or in huts made of reeds, with a thin facing of mud, and in the coldest weather prefer to lie shivering in their huts to gathering the firewood which lies almost at their hand. They are badly clad, and, as has been said, suffer terribly from the fevers that are so prevalent. A little further south, towards the confines of Persia, though the month was March, the foliage and the flowers were marvellous: wild pomegranate trees and wild briars growing under acacias and beeches were well covered with leaves; anemones, violets, and daisies bloomed everywhere. At Chifa Rud, near Resht, Talichi, a peculiar Turkish dialect is spoken, but some of the people also use Guilek. Rice and fish, of which there is abundance, are the food of the inhabitants, bread being unknown. From Teheran the travellers journeyed to Meshed, travelling almost due east, and skirting the Great Salt Desert, which presented the appearance of heaps of sand that had been lately washed by the waves of the sea. The journey through the mountains at this part was very trying. The sun was scorching, and there was not the slightest shelter to be had. The River Tchaï flows through the valley which they traversed, and was the only thing in motion in the whole region. The waters of the river are salt. Dehinemek (the "Salt Village") consists of only a few houses, and the inhabitants of it are as idle as those on the border of the Caspian, cultivating just enough to feed their families and to supply passing pilgrims. Here, as in the whole country, everything seems covered with salt. It is seen on the walls of the houses and on the banks of the rivers, and and the water one drinks is very salt. There are many travelling saltpetre-makers to be found in this region, who in summer go from place to place wherever they can find materials to work upon. Their mode of operation is a very rough and ready one. Holes in the earth serve as vats and boilers, and below these are placed ovens. Abundance of brushwood supplies them with material for their fires. They collect from the surface of the earth heaps of a compost of salt and animal manure. This is soaked for twenty-four hours in water, then filtered, and then boiled for twenty-four hours, cleansed, and placed in the sun, so that the water may evaporate. An ordinary workman can make about fifty pounds in a day, and this he sells at the rate of a penny a pound. The workers appear quite contented with their lot, and the industry is preserved in their families for generations.

Around Bostan and Shahrud, numbers of gypsy encampments were met. The inhabitants said they were natives of Seistan, and gained their living by making brass wire and working metal. Each family pays a small yearly contribution to the chief of the Shah's footmen.

They are constantly on the move, and make their tents or huts so lightly that they can dismantle them at a moment's notice. They resemble the natives very much in features, and have the same filthy habits, but they are more swarthy in complexion, and much thinner. With regard to the Turkomans, they are, or rather were—for they have ceased their depredations—the terror of the Persian pilgrims and traders. M. Bonvalot thinks that they have received a bad name which they do not deserve. They are frank, gentle, hospitable, affable, and truthful; while their victims, the Persians, are the incarnation of deceit and lying. The Turkomans, he says, have all the good qualities of the Turks, a race which has been more calumniated than any other, but from which some of the more highly esteemed European nations might with advantage learn many things. From Samarcand they journeyed to the Amu-daria, whence, completing an irregular curve, they returned to Samarcand. Upon leaving Sari-jui, they came up with a number of Uzbegs, who were coming down from the summer encampments in the mountains to their winter-quarters in the valleys. The men of the tribe ride in front, driving the cattle and horses before them, and the younger children look after lambs, goats, and calves. Some are bareheaded; others wear a dirty turban. Though they are filthy in their habits, they are wonderfully strong. Their dwellings are strong, but easily taken to pieces. As a rule, the Turkoman is not a nomad, like the Uzbeg; he has not very many cattle, so that it is not necessary for him to move to different pastures with the changes of the seasons. In the valley of the Surkhan they met many encampments of gypsies, who appear to lead the same sort of life all over Central Asia. Their tents are of the most primitive kind—two poles, with a piece of cloth spread over them. From this to Regar the country is very rich, well watered, abounding in rice-fields, but, like the other parts of Central Asia where there is a copious rainfall, fevers abound. At Kara-tagh, besides English, French, Russian, and Indian goods, various products of the district itself are sold in the market, as, for instance, rice, barley, wheat, grapes, and dried apricots. In the towns there are many blacksmiths and saddlers, and a few potters, who are very skilful in making and enamelling cups and dishes. Strange to say, the occupation which has the most numerous representatives is that of druggist. A funeral procession amongst the Uzbegs, who regard death as a blessing and not as an evil, is thus described:—

> "A small stream which crosses the road is salt, and we notice a group of men ascending its course with very rapid steps. They are carrying something on a stretcher, but, instead of going as slowly as they can, like bearers of a dead body in the West, they march at full speed, as if they were conveying some one who was very ill, or had met with an accident, to the doctor's. They go across the fields, and stumble in their hurry. They talk loudly, as if they were quarrelling, and there is not the least trace of sadness upon their faces. There are about ten of them, and they are dressed as plainly as usual. . . . In advance are several men with poles, which will be used for forming a vault on the grave, and behind comes an aged mollah, leaning upon a stick."

The travellers reached Samarcand in December, and were about to abandon the idea of going further, when General Karalkoff suggested that they should try to enter India by Pamir. It was worth trying, for nobody had ever before thought of attempting such a thing in winter. The undertaking was a great one, and they took every care in their outfit before setting out. Boots made of double felt with leather soles, with strips of skin protecting the seams, were made for them. Long stockings, made of felt, reaching up to the thigh, lined trousers with leather trousers over them, were the protections for the legs. The body was covered with two garments, one of them made of Kasghar sheepskin with the wool left on. A sheepskin cap covered the head and ears, and a huge hood of the same material enveloped the whole head and face, with the exception of the eyes. With regard to the food supply, the more remarkable portions were immense numbers of small slabs of bread soaked in fat and baked twice over; mutton boiled down, salted, and placed in bladders; roasted millet seed, and dried apricots. The journey really began at Osh on March 6, and for over a month the whole party underwent the severest privations; the goal, however, was reached at last. We have not space to say much about this journey over the Pamir, one of the most remarkable feats of travel ever accomplished, but a few extracts in M. Bonvalot's own words will show what the enterprising explorer and his companions went through:—

> "March 13. . . . The variations of temperature are very great, for at 9 a.m. the thermometer marks 75° F. in the sun and 10° F. below freezing in the shade, while at 2 p.m. it is nearly 100° F. in the sun and 3° below freezing in the shade; at 6 p.m., there are 18° of frost, while at 9.20 p.m. the glass is several degrees below zero."
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> "March 17 (when crossing the Alai). We are all of us exhausted and out of breath, devoid of all strength, and nearly blind. We have splitting headaches and a feeling of suffocation. One man is stretched out on his back, close beside his horse, which is lying on its side; another man is asleep as he stands with his head resting against the saddle; a third is whipping his poor horse, to the tail of which he clings like a drowning man to a buoy. Some of the men were bleeding from the nose, and so were the horses, the blood freezing as it trickled down their muzzles, and looking like ruby stones. . . At 6 in the morning there were 75° of frost."

On March 22 they reached an altitude of 15,000 feet on Kizilart. On March 27, when at the height of 15,700 feet—that is, at the summit of the pass of Kizil-Djek—a terrific snow-storm burst on them.

> "March 30. . . . At 2.20 a.m., with the moon still so luminous that I could distinguish objects inside the tent, I go out to look at the thermometer, and find that the mercury has vanished. It has evidently been frozen. Thinking that I may be mistaken, I show the instrument to Capus, and we light a candle, the result being that we find the mercury really has frozen up, and is no bigger than a leaden pellet."

About the beginning of April they approached human habitations, and here, near the source of the Oxus, they found numbers of monuments to the dead:—

> "The tumuli are built south-west to north-east, so that the dead may have their faces turned towards the holy city. They extend around four mausoleums made of earth, almost double the height of an *ouï* (felt tent), and with a frontage of about 30 feet. The cupolas are pointed, and the architecture very simple, as there are no materials handy to attempt anything ambitious. Moreover, if a higher building had been erected, the wind,

which is the terror of the Pamir, would soon have brought it to the ground. At the four corners of the largest of the mausoleums a rude attempt has been made to carve pigeons. At the end of the humbler tombs are some stones sunk in the earth. Some of them have a sort of railing round them, formed of stakes bound together by wooden cords."

The numerous illustrations are excellent, and the translation is well done, but it is a pity that Mr. Pitman has not given the English names of places. Many readers will not recognize in French forms names which in English forms are perfectly well-known.

THE TESTING OF MATERIALS OF CONSTRUCTION.

The Testing of Materials of Construction. By William Cawthorne Unwin, F.R.S., M. Inst.C.E. (London: Longmans, Green, and Co., 1888.)

IN a volume of about 480 pages, Prof. Unwin has condensed probably all our knowledge of the strength of materials used in construction. The work is unique in its way, there being no other equally trustworthy, as far as we are aware, in existence.

Engineering structures of to-day are designed with due regard to the strength of their individual parts, and each part is so proportioned that it will safely carry its load, yet not be of greater strength than is necessary for this special purpose. In the Forth Bridge, for example, the strains in each member are calculated to a nicety, and the section of metal is duly proportioned. This could not be done if we did not know exactly the actual strength of the various materials used, as well as their behaviour under varying conditions of load less than the breaking load of the material. It is therefore necessary that these data should be obtained by using the most perfect apparatus obtainable, and that the experiments should be made by persons who have given much time and thought to the subject. Bearing this in mind, we gladly welcome Prof. Unwin's work; his name is well known among engineers as one thoroughly able to write such a work successfully.

The volume consists of three parts. In the first, the mechanical properties of materials are explained—that is, the phenomena of elasticity and plasticity, and the relations between stress and deformation, so far as they have been scientifically ascertained. In the second, the apparatus used in the engineering laboratory is described. Lastly, the third part contains a collection of the most complete and trustworthy results of testing of all the ordinary materials in use. Chapters IV. to VII. contain admirable descriptions of various kinds of testing machines, measuring instruments, and other useful appliances used in an engineering laboratory. These chapters are freely illustrated with excellent woodcuts of the different instruments, the larger ones of the testing machines being remarkably good.

The chapters dealing with iron and steel show a large knowledge of their practical working and characteristics. We agree with the author that a standard form for tensile test pieces ought to be accepted by engineers in this country, so that results may be more easily compared.

In all the large steel-works in this country there is now to be found a testing machine with the necessary apparatus for testing the material. This is intended for the makers' own information, and it is also used by the engineers or their assistants under whose specification the steel is being made. Take, for instance, steel plates for the bridge work under the Indian Government specification. Every plate rolled is tested in the following manner in order to guard against the acceptance of brittle or dangerous steel. As each plate is delivered from the rolls, and before it is sheared to dimensions, four samples in duplicate are marked off in the spare material for testing purposes. Tensile test pieces are taken both lengthwise and across the plate, and similar ones for the quenched bend tests. These test pieces are all stamped with suitable numbers before they are sheared off the plate to be tested. The steel must be of such a strength and quality as to be equal to a tensile strength of between twenty-seven and thirty-one tons per square inch, and to indicate a contraction of the tested area at the point of fracture of not less than 35 per cent.; the percentage of elongation in a length of 10 inches must be not less than 20.

The bend test pieces, heated to a low cherry heat, and cooled in water at a temperature of 82° F., must stand bending double round a curve of which the diameter is not more than three times the thickness of the piece tested. If these requirements are not in every case satisfactory, the plate represented by a defective test is rejected; unless it can be shown that the tested specimen has surface or other defects, in which case the duplicate test-piece is duly tested to take its place.

It must be evident, therefore, that a tremendous amount of testing is now being carried out in this and other countries, and the value of the material, the acceptance or rejection of which depends on the results of the tests, will reach a large amount. On this account we are always glad to increase our knowledge of the behaviour of the material under test, and of the machinery used in the process.

Prof. Unwin is to be congratulated on having successfully fulfilled his task. The work is worthy of his reputation, and should find a place in every engineer's library.

OUR BOOK SHELF.

Entomology for Beginners. For the Use of Young Folks, Fruit-growers, Farmers, and Gardeners. By A. S. Packard, M.D., Ph.D. Small 8vo, pp. xvi. and 367. (New York: Henry Holt and Co., 1888.)

DR. PACKARD'S works on entomological subjects are so well and favourably known, that the book he has now written under the above modest title will certainly obtain a large circulation.

As its name implies, it is a work especially addressed to beginners in the study of entomology, and gives them a brief outline of the extent of the subject, and descriptions of the various methods pursued in its research.

In some respects this work is based upon the same author's "Guide to the Study of Insects," many of the paragraphs being the same in both books and also many of the woodcuts which illustrate them. But the portion relating to classification is much abridged in the smaller book, whilst that which treats of the mounting of microscopic preparations, &c., is given at much greater length. It is this latter part that will be found of more permanent value to the student, who will soon master the brief classification put before him.